



an introduction to

# Wisconsin's Forest Sustainability Framework

Creating the knowledge to  
sustain our forests



## ***Sustainable Forestry:***

*The practice of  
managing dynamic  
forest ecosystems to  
provide ecological,  
economic, social, and  
cultural benefits for  
present and future  
generations.*

(Wisconsin State Statute 28.04(1)e)



## What is a forest?

Wisconsin's forest resource is vast, and bigger than one might imagine. When we think of Wisconsin's forests, we often think first of the tall trees and large spaces of the Northwoods. Although rural forests provide important benefits to the state, Wisconsin also contains forests, woodlands, and woodlots that are intermixed with farms, communities, and residential property. Just like rural forests, the urban forest's parks, street trees, and back yards provide recreational, ecological, and habitat benefits and services to communities.

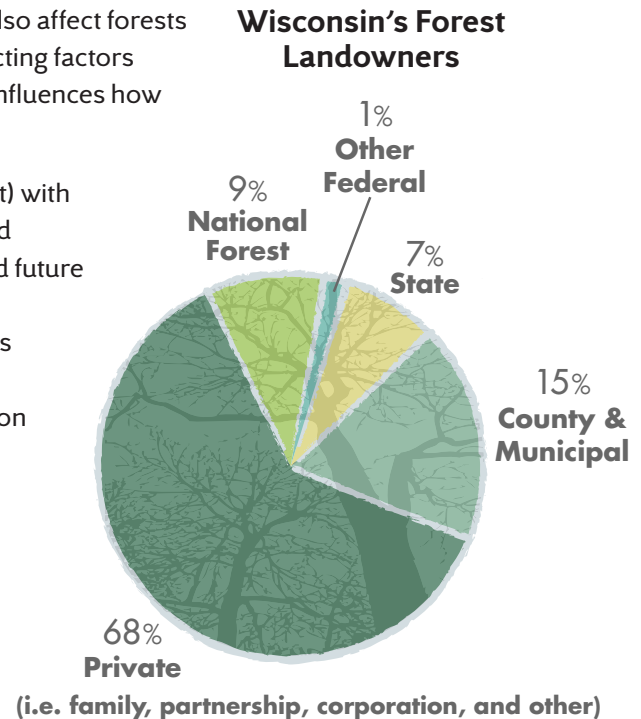


# Are Wisconsin's Forests Sustainable?

Wisconsin's forests are ever-changing. Ecological factors such as forest growth, insects, and disease change forests. Cultural, economic, and social factors such as timber production and recreational use also affect forests and, in some cases, alter them. This mix of changing and interacting factors determines the benefits and services our forests provide, and influences how forests sustain society – now and in the future.

Forests are owned by many different landowners (figure at right) with varying goals for their land. For example, the Northern Highland American Legion State Forest is managed to benefit present and future generations of Wisconsin residents by contributing to local and statewide economies and to a healthy natural environment. This management goal contrasts with the thousands of private woodland owners who manage their land for personal recreation and aesthetic reasons.

*Sustainable management of Wisconsin's ever-changing forests requires a broad and comprehensive perspective and a knowledge base that covers the full range of values that people hold toward forests.*



## The Wisconsin Forest Sustainability Framework

Wisconsin's Forest Sustainability Framework (Framework) provides a common system to measure the sustainability of the state's public and private forests. This report is comprehensive in that it includes a wide range of perspectives and values that people hold about forests.

Evaluating our current situation requires being able to point to different factors that affect sustainability, and then adapt management as necessary.

The Framework establishes a science-based method of gathering and organizing data. It creates knowledge that can inform decision-makers, resource professionals, and the public.

This publication provides an overview of the intent and design of Wisconsin's Framework, and describes its evolving role in shaping forest management and policy. This is the first in a series of publications that will share data and knowledge using the specific language and structure of the Framework to inform decisions and policies about public and private forestland.





# How is the **Framework** Organized?

To provide a broad knowledge base, the Framework is made up of seven categories (criteria) that are commonly used to assess sustainability. Much like statewide economic indicators that inform the public on the status of housing or employment trends, the Framework can track data to identify important trends and issues affecting Wisconsin's forests. In doing so, the Framework can be used to assess the effectiveness of existing forest practices and policies.

The Framework identifies specific data sources to be collected. Data will be collected as part of the Statewide Forest Assessment (Assessment) to be completed in 2010. The Assessment will drive the development of the Statewide Forest Strategy (Strategy) to follow soon after. Both the Assessment and Strategy are initiatives of the Department of Natural Resources Division of Forestry.

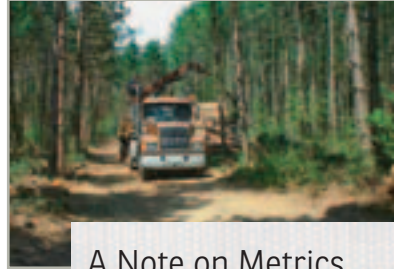
Likely benefits of the Framework include:

- Increasing public awareness of forests and the benefits and services they provide
- Establishing a common language and measures that will allow diverse interests to discuss forests and their sustainable use
- Creating a shared knowledge base to inform management and policy
- Serving as a means to assess the success and effectiveness of forest policies and management

## Measuring Sustainability

The Framework is organized into three levels: criteria, indicators, and metrics. Wisconsin's Framework is consistent with global, national, and state systems that measure forest sustainability.

**Criteria** define broad categories of conditions used to assess sustainability. The seven criteria are concrete ways of evaluating the sustainability of Wisconsin's forests. Considered



### A Note on Metrics

In developing the Framework, metrics were only included where reliable data sources already existed. Given historic and current data sources, we know more about some trends than others. For example, the USDA Forest Service has collected forest inventory and production data for decades. Other measures and parts of the forest resource have received less attention and do not have established, broad-scale, and/or existing data. While no data, or outdated data, exist for these measures, the Framework recognizes their importance to a full understanding of forest sustainability. Some examples of needed measures include the following:

1. Update of 1992 data from WISCLAND, the satellite imagery and analysis program that provides data on forest cover and type in Wisconsin;
2. A continuous urban forest inventory and assessment in order to identify trends and issues in the urban forest.
3. Models that analyze old growth stand structure to understand how biodiversity is affected by stand age and structure.

The Framework encourages partners and stakeholders to create and invest in new research and data sources to fill these (and other) gaps in our knowledge. As new information and data become available, they will be incorporated into the Framework. In recognizing these gaps, the Framework offers the opportunity to evolve our understanding of Wisconsin's changing forests and how sustainability is defined.

collectively, they reflect sustainability in its broadest context. The strength of the Framework is that it is not simply about timber or recreation or biodiversity; it assesses data across many measures at the same time.

**Indicators** measure an aspect of each criterion. Indicators represent a qualitative or quantitative variable that can be measured or described. Using the previous analogy of Wisconsin's economy, we use indicators such as housing growth and construction to understand the health of the real estate industry. In the Framework, indicators such as the amount and density of existing forestland, and the amount of forest cover will, for example, help us understand different factors affecting the health of wildlife habitat.

**Metrics** are the specific units of measurement that provide data to assess each indicator. Metrics were chosen by the Advisory Committee (see sidebar on facing page) and are based on existing long-term scientific studies. Data sources for the metrics are diverse and include organizations and agencies such as the USDA Forest Service, Wisconsin Department of Revenue, Conservation Biology Institute, US Census Bureau and the Breeding Bird Survey.

A complete list of the criteria, indicators, and metrics is found at the end of this publication.





## The Next Steps:

The Framework establishes a common language for people and organizations to discuss and assess forest sustainability. In doing so, it will lead to greater communication and cooperation among all those interested in Wisconsin's forests. Working together, different groups and individuals involved in forest management can use the Framework to identify and enact appropriate management to create and maintain sustainable forests.

As a planning document, the Framework will also be useful for forest managers and policy-makers. For these people, data collected for the Framework will provide valuable information with which to make informed decisions.

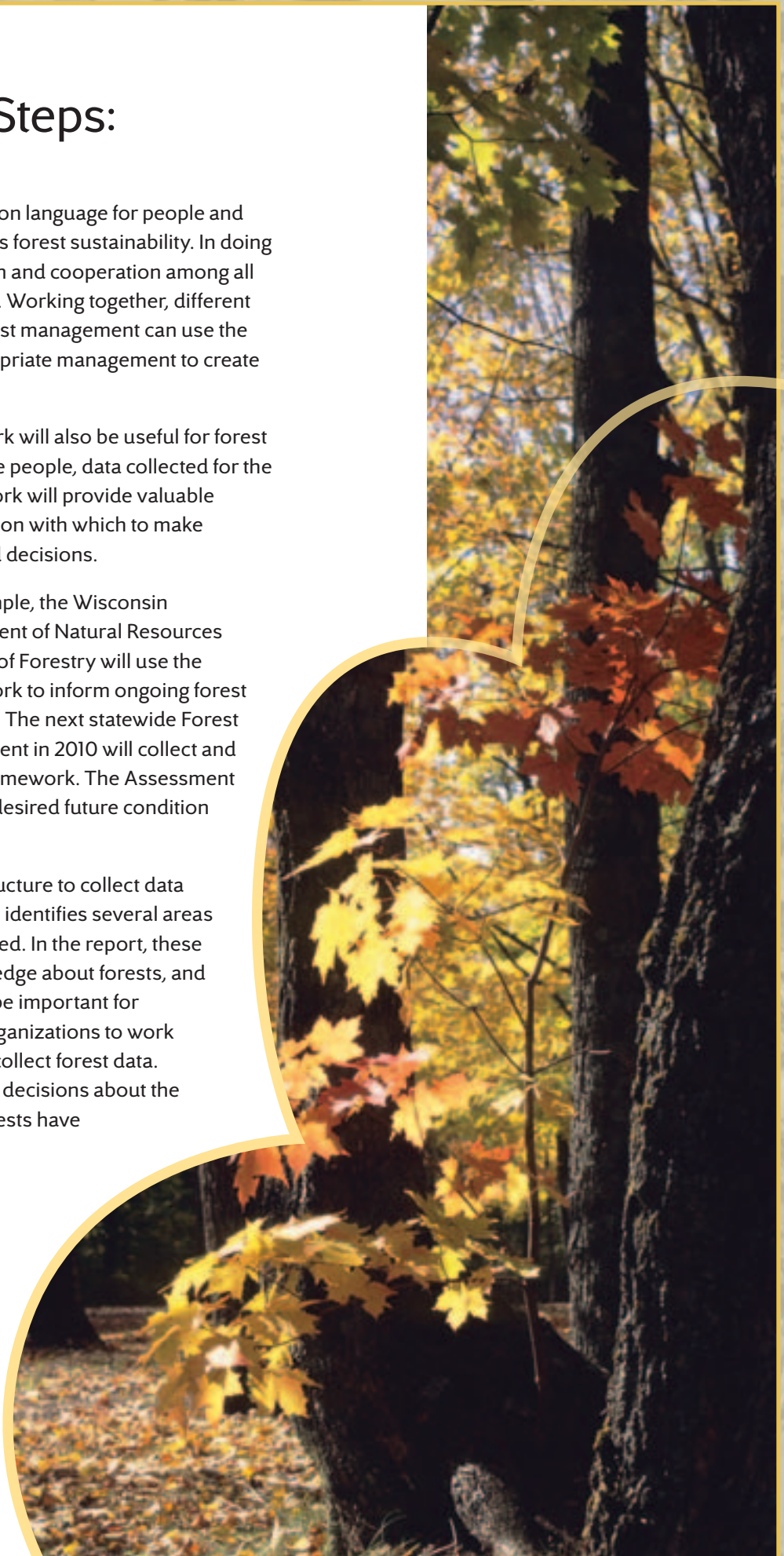


For example, the Wisconsin Department of Natural Resources Division of Forestry will use the Framework to inform ongoing forest planning. The next statewide Forest Assessment in 2010 will collect and

analyze data using indicators in the Framework. The Assessment will facilitate a discussion on what the desired future condition of our forests will be.

While the Framework establishes a structure to collect data related to sustainability, the report also identifies several areas where knowledge about forests is limited. In the report, these areas are called "data gaps." As knowledge about forests, and available data sources increase, it will be important for government, private, and non-profit organizations to work together to monitor forest health, and collect forest data. Monitoring is essential to making good decisions about the future and explaining how and why forests have changed over time.

As experience and knowledge grow, improvements will be made in the way Wisconsin defines, measures, and reports its progress toward the sustainable management of its forests.



# Wisconsin's Seven Criteria of Sustainability

## Criterion 1: Biological Diversity

Biological diversity is a fundamental requirement for forest health, sustainability, and productivity. Maintaining diversity is critical for species and ecosystems to remain viable and retain their ability to evolve and adapt to change.

The indicators for this criterion describe forest characteristics, the extent of forest fragmentation, development pressures, and forest habitat for threatened and endangered species.



## Criterion 2: Productive Capacity

Society depends on forests for important raw materials. This criterion will determine if forests are managed to produce wood and non-timber products in a way that allows for continuous forest renewal. Maintaining productive capacity is a delicate balance. It is not simply harvesting less than we grow. We need to be sensitive to how forests change in response to not just human action such as harvesting and development, but also natural disturbances like wind, climate, and disease. Finding and maintaining this balance is essential given the importance of forest products to the state's economy.

Indicators for this criterion will provide data on the amount of timberland in the state, as well as the amount of net tree growth, and removals of forest products (including non-timber products).



## Criterion 3: Ecosystem Health and Vitality

Healthy and vibrant forests are better able to adapt to change and recover from disturbance. Whether from natural or human causes, forests can be degraded in ways that reduce or imperil benefits important to society (e.g., clean water, pollution mitigation, wood products, and wildlife habitat).

Indicators for this criterion will measure the amount of forestland affected by potentially damaging agents such as fire, disease, insects, invasive plants, and ozone.



## Criterion 4: Soil and Water Resources

Soil and water are essential elements to all ecosystems. In forests, soil and water resources support the growth of trees and other plants. On a larger scale, the amount and quality of soil and water resources determine an ecosystem's ability to sustain forests, forest economies, and forest-dependent communities.

Indicators for this criterion include forest soil quality, the area of forestland adjacent to surface water, and water quality in forested areas.



## Criterion 5: Contributions to Global Carbon Cycle

One major benefit of forests is their role in local and global carbon cycles. Carbon dioxide is a major greenhouse gas emitted by cars and other fossil-fuel burning machines. As trees grow, forests naturally take up and store, or sequester, carbon. This process removes atmospheric carbon dioxide and acts as a carbon "sink." At other points in their lives, trees and other forest products can be harvested and turned into products that can release their carbon quickly (e.g., firewood) or store their carbon (e.g., furniture). Since forests and forest products can store carbon, forests can help reduce carbon dioxide, and potentially temper the effects of climate change.

Indicators for this criterion include measures of carbon stored in live trees, down and dead wood, the forest floor, and tree roots. Carbon storage will also be measured by forest type, and changes in the amount of overall forest carbon per year will be assessed.



## Criterion 6: Benefits of Forests and their Ecosystem Services

Forest ecosystems provide many socioeconomic benefits and services including employment, recreation, and diverse socioeconomic sectors. By indicating concrete ways in which forests benefit Wisconsin's culture and economy, these measurements may help support the future of forests and their ability to produce ecosystem services over the long term.

Indicators for this criterion include employment in forest industries; the amount and value of wood and wood products; expenditures on forest-based recreation; and investments in forest health, management, research, and education.



## **Criterion 7: Legal and Institutional Framework for Conservation and Management**

In order to maintain sustainable forests, legal and social systems must support and promote sustainable use and management, as well as public awareness and respect for forest resources. These functions may be encouraged and enforced through social institutions, economic incentives, policy, and guidelines written into legislation. However, laws and policies alone do not manage forests. Their implementation needs to be evaluated to ensure they work as intended. It is also important to consider how such laws and policy interact, because such interactions can lead to unintended consequences.

Indicators for this criterion include forest management standards and laws, compliance data as part of regulatory reporting, and forest-related plans and assessments.

## **Creating the Framework**

The conceptualization of a Wisconsin Framework began in 2006, when the Wisconsin Council on Forestry called for an active increase in the accountability of sustainable forest management in Wisconsin. They assembled a diverse Advisory Committee to build the Sustainability Framework. Their dedication is the strength of this report.



Committee members represented diverse perspectives, and were chosen from private forestry, conservation organizations, academic institutions, tribes, the

forest industry, government, and non-profit organizations. The Council on Forestry formally accepted the Framework on December 18, 2007, with the intent that it provide a basis for understanding forest trends and assist statewide forest planning.

### **COMMITTEE MEMBERS:**

**Stefan Bergmann, Great Lakes Forest Alliance**

**John DuPlissis, University of Wisconsin-Stevens Point**

**Gene Francisco, Great Lakes Timber Professionals Association**

**Jonathan Gilbert, Great Lakes Indian Fish & Wildlife Commission**

**Richard Hauer, University Wisconsin-Stevens Point**

**Lisa MacKinnon, 1000 Friends of Wisconsin**

**Nick Miller, The Nature Conservancy**  
**Gordy Mouw, Stora Enso**

**Mike Prouty, USDA Forest Service, Northeastern Area State & Private Forestry**

**Gene Roark, Wisconsin Woodland Owners Association**

**Mark Rickenbach, University of Wisconsin-Madison/Extension**

**Jane Severt, Wisconsin County Forest Association**

**Lynn Wilson, Plum Creek**

**Darrell Zastrow, Wisconsin Department of Natural Resources**

## Summary of Criteria

- = Indicator
- ▶ = Metric

The following is a list of all criteria and associated indicators and metrics that appear in the Framework. To view the full report with a description of all the data sources, go to:

<http://council.wisconsinforestry.org/framework>

### Criterion 1: Conservation of Biological Diversity

- 1. *Area of total land, forestland, and reserved forestland*
  - ▶ Forest and total land area
  - ▶ Forest density
  - ▶ Legally and administratively reserved forestland (i.e., limited management)
  - ▶ Urban forest
- 2. *Forest type, size class, age class, successional stage*
  - ▶ Forest cover type
  - ▶ Size class
  - ▶ Age group
- 3. *Extent of forestland conversion, fragmentation, and parcelization*
  - ▶ Forestland developed
  - ▶ Net change in forestland
  - ▶ Additions to and conversions from forestland
  - ▶ Forest parcel size
  - ▶ Lands with various legal limitations on conversion
  - ▶ Road density
  - ▶ Housing density
- 4. *Status of forest/woodland communities and associated species of concern*
  - ▶ Forest & woodland communities
  - ▶ Forest associated species of concern
  - ▶ Bird populations
  - ▶ Mammal populations

### Criterion 2: Maintenance of Productive Capacity of Forest Ecosystems

- 5. *Area of timberland*
  - ▶ Amount of timberland
- 6. *Annual growth and removals of forest products*
  - ▶ Net growth and removals
  - ▶ Type of removals
  - ▶ Total growing stock and tree grade of both merchantable timber and non-merchantable tree species on forestland available for timber production
  - ▶ Annual removal of non-timber forest products

### Criterion 3: Maintenance of Forest Ecosystem Health and Vitality

- 7. *Area of forestland affected by potentially damaging agents*
  - ▶ Tree mortality and damage type
  - ▶ Catastrophic events
  - ▶ Climate
  - ▶ Disease and insects
  - ▶ Invasive plants
- 8. *Area and percent of forestland subject to levels of specific air pollutants that may cause negative impacts on forest ecosystems*
  - ▶ Ozone damage

### Criterion 4: Conservation and Maintenance of Soil and Water Resources

- 9. *Soil quality on forestland*
  - ▶ Area and percent of forest whose designation or land management focus includes protection of soil resources
  - ▶ Proportion of forest management activities that meet soil management guidelines to protect soil resources
  - ▶ Total soil carbon
  - ▶ Estimated bare soil
  - ▶ Bulk density
  - ▶ Calcium-aluminum ratio
- 10. *Area of forestland adjacent to surface water and forestland by watershed*
  - ▶ Percentage of riparian areas that are forested by watershed
  - ▶ Percentage of forestland by watershed
- 11. *Water quality in forested areas*
  - ▶ Area and percent of forest whose designation or land management focus includes protection of water resources
  - ▶ Proportion of forest management activities that meet BMPs to protect water quality
  - ▶ Number of certified loggers and acres managed
  - ▶ Stream miles impaired by sediment, nutrients, and temperature
  - ▶ Impervious surface

## Criterion 5: Maintenance of Forest Contributions to Global Carbon Cycles

- **12. Forest ecosystem biomass and forest carbon pools**
  - ▶ Forest ecosystem biomass
  - ▶ Forest carbon pools
  - ▶ Forest carbon by forest type
  - ▶ Change in forest carbon

## Criterion 6: Socioeconomic Benefits of Forests and their Ecosystem Services

- **13. Wood and wood products production, consumption, and trade**
  - ▶ Value of wood-related products
  - ▶ Production of roundwood
  - ▶ Production and consumption of roundwood equivalent
  - ▶ Recovered paper
  - ▶ Value of non-timber forest products
  - ▶ Chain-of-custody certified forest product businesses
- **14. Outdoor recreational participation and facilities**
  - ▶ Participation in outdoor recreation
  - ▶ Public lands open to recreation
  - ▶ Recreational facilities on public lands
  - ▶ Recreation trails
  - ▶ Number of campgrounds
- **15. Investments in forest health, management, research, education, and wood processing**
  - ▶ USDA Forest Service Northeastern Area State & Private Forestry funding
  - ▶ State forestry agency funding
  - ▶ Funding for forestry research
  - ▶ Capital expenditures by manufacturers of wood-related products
  - ▶ Funding for forestry education (K-12 programs)
  - ▶ Number of university and technical college forestry graduates
  - ▶ Funding for continuing forestry education for foresters and loggers and number of participants

- **16. Forest ownership, land use, and specially designated areas**
  - ▶ Forestland and population
  - ▶ Forestland ownership
  - ▶ All public lands
  - ▶ Protected lands
  - ▶ Private land with public conservation easements
  - ▶ Forestland in property tax incentive programs
  - ▶ Forest acres certified
- **17. Employment and wages in forest-related sectors**
  - ▶ Wood-related products manufacturing employees, payroll, and wages
  - ▶ Forestry employment and salaries in Wisconsin

## Criterion 7: Legal and Institutional Framework for Forest Conservation and Sustainable Management

- **18. Extent to which the legal and institutional structure supports the sustainable management of forests**
  - ▶ Types of forest management standards by category, noted as voluntary or mandatory, and whether they contain a monitoring component
  - ▶ Statewide or regional statutory forest advisory committees
  - ▶ Statewide or regional forest-related organizations
- **19. Forest-related planning and assessment**
  - ▶ Statewide forest planning (and assessment)
  - ▶ Private non-industrial forest planning
  - ▶ Industrial forest planning
  - ▶ Government (including tribal) forest planning

Additional copies available from:

Wisconsin Department of  
Natural Resources  
Division of Forestry  
PO Box 7921  
Madison, WI 53707

an introduction to

# Wisconsin's Forest Sustainability Framework:

Creating the knowledge to sustain our forests

Written by:

Kathleen Kiefaber, Associate Forest Planner, Wisconsin DNR

Rebecca Gass, Forest Planner, Wisconsin DNR

Mark Rickenbach, Associate Professor and Extension Specialist,  
Department of Forest and Wildlife Ecology,  
University of Wisconsin-Madison/Extension

Appointed by the Governor, the Wisconsin Council on Forestry is a diverse group of leaders in the forest community who direct Wisconsin's efforts to achieve sustainable forestry. Their guidance and support has proved invaluable during the development of the Framework. To learn more about the Council and the Framework, visit their website:

**<http://council.wisconsinforestry.org>**

DNR PUB-FR-424 -2008

An Introduction to Wisconsin's Forest  
Sustainability Framework

January, 2009

The Wisconsin Department of Natural Resources provides equal opportunity in its employment programs, services and functions, under an Affirmative Action Plan. If you have any questions, please write to Equal Opportunity Office, Department of Interior, Washington, D.C. 20240. This publication is available in alternative format (large print, Braille, audiotape etc.) upon request. Please call 608/267-7494 for more information.

Graphic design by Jeffrey J. Strobel, UW-Extension  
Environmental Resources Center.

Photos courtesy of Jeffrey J. Strobel unless  
otherwise noted.

Pie chart by Annika Sargent.



**PRINTED ON  
RECYCLED PAPER**



**UW  
Extension**